

We claim:

1 1. A device for transmitting an excursion of an actuator, comprising at least one  
2 transmission element, a first, a second, and a third bearing area, wherein the first  
3 bearing area is assigned to a counter bearing, the second bearing area is assigned to the  
4 actuator and the third bearing area is assigned to a control member, wherein the at  
5 least one transmission element is supported with the first bearing area against the  
6 counter bearing when the actuator is operated and moves the control member with the  
7 third bearing area by means of a rotational motion about a point of rotation, wherein  
8 the at least one transmission element is configured substantially in the form of a plate,  
9 which is disposed substantially perpendicular to the control motion, and wherein the  
10 first, second and third bearing areas are each configured as substantially flat surfaces  
11 on the plate.

1 2. The device according to Claim 1, further comprising a distance between a  
2 central axis of the actuator and a central axis of the control member.

1 3. The device according to Claim 1, further comprising at least two transmission  
2 elements, which are disposed opposite each other.

1 4. The device according to Claim 1, further comprising at least three transmission  
2 elements, which are disposed in a substantially concentric manner in respect of each  
3 other.

1 5. The device according to Claim 3, further comprising concentric central axes of  
2 the actuator and the control member.

1 6. The device according to Claim 1, wherein the plate of the at least one  
2 transmission element is configured in a stepped manner.

1 7. The device according to Claim 6, wherein the second bearing area is assigned  
2 to an upper side and the third bearing area is assigned to a lower side of a first straight  
3 section of the stepped plate.

1 8. The device according to Claim 6, wherein the first bearing area is assigned to a  
2 lower side of a second straight section of the stepped plate.

1 9. The device according to Claim 6, wherein the first and second straight sections  
2 of the stepped plate are connected by means of a connecting section.

1 10. The device according to Claim 6, wherein the second straight section of the  
2 stepped plate encompasses a lower sleeve area of the actuator.

1 11. The device according to Claim 6, wherein the upper side of the first straight  
2 section and the lower side of the second straight section lie approximately on a  
3 common plane.

1 12. The device according to Claim 1, wherein the plate is produced by cold or hot  
2 forming.

1 13. The device according to Claim 1, further comprising ground surfaces of the  
2 bearing areas of the plate.

1 14. The device according to Claim 1, wherein an intermediate member connected  
2 to the actuator is provided between the actuator and the second bearing area of the at  
3 least one transmission element.

1 15. The device according to Claim 14, further comprising a positive, non-positive  
2 or material-fit connection between the actuator and the intermediate member.

1 16. The device according to Claim 14, wherein the intermediate member  
2 comprises at least one raised edge, which is in contact with the second bearing area of  
3 the at least one plate.

- 1 17. The device according to Claim 16, further comprising linear contact between  
2 the raised edge of the intermediate member and the second bearing area of the plate.
- 1 18. The device according to Claim 16, further comprising a raised edge height of  
2 approximately 200  $\mu\text{m}$ .
- 1 19. The device according to Claim 16, further comprising a rounded raised edge.
- 1 20. The device according to Claim 14, wherein the second bearing area of the at  
2 least one plate comprises at least one raised edge, which is in contact with the  
3 intermediate member.
- 1 21. The device according to Claim 20, further comprising linear contact between  
2 the raised edge of the second bearing area of the plate and the intermediate member.
- 1 22. The device according to Claim 20, further comprising a raised edge height of  
2 approximately 200  $\mu\text{m}$ .
- 1 23. The device according to Claim 20, further comprising a rounded raised edge.
- 1 24. The device according to Claim 1, wherein at least one support element is  
2 provided as the counter bearing between a housing and the first bearing area of the at  
3 least one transmission element.
- 1 25. The device according to Claim 24, wherein the support element comprises a  
2 raised edge, which is in contact with the first bearing area of the at least one  
3 transmission element.
- 1 26. The device according to Claim 25, further comprising a linear contact between  
2 the raised edge of the support element and the first bearing area of the transmission  
3 element.

- 1 27. The device according to Claim 25, further comprising a raised edge height of  
2 approximately 200  $\mu\text{m}$ .
- 1 28. The device according to Claim 25, further comprising a rounded raised edge.
- 1 29. The device according to Claim 24, further comprising ground surfaces of the  
2 intermediate member and/or the support element.
- 1 30. The device according to Claim 1, wherein the actuator is a piezoelectric  
2 actuator.
- 1 31. The device according to Claim 1, further comprising a translation ratio in the  
2 range of approximately 1:4 to 1:20 of an excursion of the actuator to an excursion of  
3 the control member.
- 1 32. The device according to Claim 1, further comprising a translation ratio of  
2 approximately 1:6 of an excursion of the actuator to an excursion of the control  
3 member.
- 1 33. The device according to Claim 1, further comprising a triangular contour of the  
2 longitudinal section of the plate.
- 1 34. The device according to Claim 1, for transmitting an excursion of an actuator,  
2 in particular a piezoactuator of an injection valve, wherein at least a first lever device  
3 and a second lever device are provided, and whereby the excursion of the actuator is  
4 transmitted from the first lever device to the second lever device.
- 1 35. The device according to Claim 34, wherein the excursion of the actuator is  
2 transmitted from the second lever device to a control member.
- 1 36. The device according to Claim 34, wherein the first lever device and/or the  
2 second lever device comprises at least one transmission element disposed substantially  
3 perpendicular to the direction of excursion of the actuator.

1 37. The device according to Claim 36, wherein at least one transmission element is  
2 substantially plate-shaped.

1 38. The device according to Claim 36, wherein at least one surface of at least one  
2 transmission element is convex.

1 39. The device according to Claim 36, wherein it comprises a first transmission  
2 element with a first, second and third bearing area and a second transmission element  
3 with a fourth, fifth and sixth bearing area, whereby the first bearing area is assigned to  
4 a first counter bearing, the second bearing area is assigned to the actuator, the third  
5 bearing area is assigned to the second transmission element, the fourth bearing area is  
6 assigned to a second counter bearing, the fifth bearing area is assigned to the first  
7 transmission element and the sixth bearing area is assigned to a control element.

1 40. The device according to Claim 39, wherein the first transmission element is  
2 supported with the first bearing area against the first counter bearing when the actuator  
3 acts on the second bearing area and acts with the third bearing area on the fifth bearing  
4 area of the second transmission element by means of a rotational motion, said  
5 transmission element being supported with the fourth bearing area against the second  
6 counter bearing and acting with the sixth bearing area on the control member by  
7 means of a rotational motion.

1 41. The device according to Claim 39, wherein an actuator central axis and a  
2 control element central axis pass through the second bearing area and the sixth bearing  
3 area.

1 42. The device according to Claim 1, wherein at least one counter bearing and/or  
2 at least one transmission element comprises at least one rounded section in the area of  
3 the first or fourth bearing area, said rounded section allowing rolling in respect of a  
4 relative motion between a housing and the transmission element.

1 43. The device according to Claim 42, wherein at least one rounded section is  
2 formed by at least one separate element.

1 44. The device according to Claim 42, wherein at least one separate element is  
2 supported in a rotatable manner in the housing.

1 45. The device according to Claim 42, wherein at least one separate element is  
2 supported in a movable manner in the housing.

1 46. The device according to Claim 42, wherein at least one separate element is  
2 formed by a sphere or a drum.

1 47. A method for producing a transmission element for a device comprising the  
2 steps of:  
3 - providing a first, a second, and a third bearing area,  
4 - assigning the first bearing area to a counter bearing,  
5 - assigning the second bearing area to the actuator,  
6 - assigning the third bearing area to a control member,  
7 - supporting the at least one transmission element with the first bearing area against  
8 the counter bearing when the actuator is operated and moves the control member with  
9 the third bearing area by means of a rotational motion about a point of rotation,  
10 - configuring the at least one transmission element substantially in the form of a plate,  
11 which is disposed substantially perpendicular to the control motion,  
12 - configuring the first, second and third bearing areas as essentially flat surfaces on the  
13 plate, and  
14 - forging and/or milling the transmission element and then grounding the transmission  
15 element on at least one bearing area.

1 48. The method according to Claim 47, wherein the intermediate member is  
2 ground at least on its surfaces in contact with the second bearing area of the at least  
3 one transmission element.

1 49. The method according to Claim 47, wherein the support element is ground on  
2 at least its surfaces in contact with the first bearing area of the at least one  
3 transmission element.

1    50.    Injection device with a device for transmitting an excursion of an actuator,  
2    with at least one transmission element, comprising a first, a second, and a third bearing  
3    area, wherein the first bearing area is assigned to a counter bearing, the second bearing  
4    area is assigned to the actuator and the third bearing area is assigned to a control  
5    member, wherein the at least one transmission element is supported with the first  
6    bearing area against the counter bearing when the actuator is operated and moves the  
7    control member with the third bearing area by means of a rotational motion about a  
8    point of rotation, wherein the at least one transmission element is configured  
9    substantially in the form of a plate, which is disposed substantially perpendicular to  
10   the control motion, and wherein the first, second and third bearing areas are each  
11   configured as essentially flat surfaces on the plate.

1    51.    Injection device according to claim 50, wherein the device operates by a pump-  
2    nozzle principle.